Market Structure and Innovation: A Brief Synopsis of Recent Thinking
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Introduction.

I want to thank the FTC for giving me the opportunity to speak. Before we start I need to say that I have no financial interests in any present or recent antitrust case.

A central question motivates the literature I will now discuss: Do large firms with market power deserve special antitrust scrutiny in markets characterized by robust innovative activity? This motivates much recent thinking about the relationship between market structure and innovative activity. I will provide a brief synopsis of traditional and recent academic thinking.

Let me foreshadow the main message of recent thinking: Public policy should distinguish between environments where intellectual property is effective and where it is not. When it is not, policy should be concerned when a dominant firm uses non-innovative tactics to move the locus of competitive behavior away from innovative activity.

The Setting.

The economic benefits from commercializing technology are essential for modern economic growth. Successful commercial innovation enhances welfare, especially when

it leads to lower prices and new services, even when both threaten the established order of business.

Technology markets are characterized by business, technical and market uncertainty. Even experts will have differing market forecasts and views about the best commercial options. Hence, it is difficult to evaluate competitive behavior for a potentially ephemeral market structure.

Altogether, this is an cautious setting. The topic is important, but policy makers must begin from a relatively humble position. To be sure, that is not the same as forbearance.

Still, one minimal principle arises. Competition policy can seek robust commercial experimentation and encourage multiple commercial visions, even for innovations with modest probabilities of succeeding. This conclusion arises because even failures are useful. One innovation might fail, but in failing, may teach others who are working on their own innovations. If eventually this original failure leads to commercial success, then the benefits from an informative failure can easily exceed the foregone spent resources by orders of magnitude.[1] Hence, commercial failure should not be thought of as a obvious waste of resources -- the recent experience with "dot-bombs" not withstanding.

Of course, this also does not get us very far.

A traditional approach.

There is a traditional approach to the central question, which concludes that monopolies deserve special scrutiny. This conclusion arises from the concern that monopolies have low incentives to innovate.[2] To understand this intuition, compare an

inventor selling his invention to a monopolist to an inventor selling into an industry with competitive supply, where otherwise things are equal. The monopolist will be concerned about the cannibalization of the monopoly rents he enjoys in the product market, whereas competitive firms will not. According to this argument, firms with market power do not spend as much on innovative activity, and, in line with extensions in the same spirit, monopolists also do not commercialize innovations as quickly.

A contrasting traditional approach focuses on a monopolist's use of innovative activity to preserve its position.[3]. In this view, a forward-looking monopolist, identifying a threat from an entrant who can credibly buy the invention, will innovate robustly. In general, an incumbent monopolist has more to lose in falling from a position of monopoly than any new entrant has to gain from entering, so the monopolist's incentives are higher than the entrant's.

Many researchers have held up these two views as directly contradictory. I think it is more insightful to characterize them as distinctly different hypothetical scenarios. To see this, meld them together with a semantic shift:[4] Consider a vertically differentiated product market. Let the inventor sell a qualitatively better product into one of three types of market structures: (1) a “protected monopolist” who has sole control over the output market, (2) a “threatened monopolist” who anticipates entry, or (3) a competitive industry.

In this setting, the protected monopolist obviously has lower incentives to innovate due to cannibalization concerns. But what about the incentives of the threatened monopolist and the inventor in the competitive market? It turns out their incentives do not differ much from each other. [4]

Overall, these insights do not lead to satisfying guidance. They suggest that policy be established to prevent firms with market power from protecting themselves from threats. While this insight is in line with much of the spirit of anti-trust law, it is impractical to put into practice. To do so, policymakers must find information about the presence of a monopoly, the potential for another entrant, and the incumbent's calculations about a threat from an innovative entrant. These are awkward and problematic actions in practice.

Recent thinking.

Recent thinking reframes the analysis of the central question about large firms: It presumes we live in a world of widely distributed technical knowledge, where many small firms have access to some, if not all, of the technical assets necessary for inventive activity. In addition, commercializing those inventions involves use of real assets from both disinterested parties, such as venture capitalists, and deeply interested parties, such as incumbent firms.

Entrants must incur entry costs to compete with incumbents, or, alternatively, make deals with them. The crucial point is that each of those choices requires distinctly different sunk investments. Indeed, most small firms treat these as mutually exclusive decisions.[5]

This approach directs attention toward two questions. First, if the two parties cooperate, do incumbents have assets that significantly raise the value of the invention in its commercial form? [6] As it turns out, policy issues arise in markets where incumbent's assets are valuable, which is to say, in most innovative markets.

Second and especially crucial, if the two parties compete, can entrants effectively exclude the incumbent from imitating their invention? [7], [8] Most markets lie between two extreme situations, those where entrants can exclude imitation by the incumbent and those where they cannot. To be sure, the effectiveness of intellectual property -- such as patent law -- plays a key role in determining which situation arises.

When inventors can exclude imitation, then markets for tradable technologies arise. Licensing or joint ventures are common. Inventors tend to cooperate with incumbents holding valuable assets. Sometimes these deals raise value for everyone. Sometimes these deals are collusive. The larger point is that inventors tend to act as the source of ideas, but they do not tend to overturn commercial leadership. For example, the relationship between biotechnology and pharmaceutical companies today tends to resemble this predicted pattern. So too do international chemical markets.[9] [10]

In contrast, when entrants cannot easily exclude imitation, incumbent strategies toward bargaining with inventors strongly shape the incentives to innovate for both incumbent and entrant. Knowing this, large incumbents can and do use the bargaining process to alter incentives of the small. Incumbents can and do take actions designed to increase or diminish an entrant's incentives to compete.

It is important to understand the wide range of economic behavior that arises during bargaining, so let me offer two contrasting illustrations.

On the one hand, some large firms have developed reputations for not walking away from potential deals with proprietary information. For some years now, Cisco maintained strict policies about when it would buy a firm and for how much. Such predictability had a large influence on venture capitalists and small inventive firms that

viewed Cisco as a potential target buyer or commercial partner. Cisco's policies certainly altered inventor/entrant incentives to develop products, even when Cisco was the target buyer. To be sure, the late nineties would have witnessed much innovation in communications equipment markets under any scenario, but Cisco's action certainly induced entry on the margin, much of it favorable to Cisco.

On the other hand, negotiations can also be confrontations. It is well known that in the spring of 1995, Microsoft threatened to withdraw API support from Netscape if Netscape refused a cooperative deal. Even though such API information was readily given to others, it was well understood by all parties that this was one of several carrots/sticks for eliciting cooperation and Microsoft typically offered such carrots/sticks to small firms. It was also understood by everyone that withdrawing API support would slow down the pace of innovative activity at Netscape and delay the introduction of new features to Netscape's products.

Notice that recent thinking widens the scope of the analysis. At the same time, it provides more nuance in its view of innovative behavior

More to the point, it focuses policy questions in a particular direction. For policy purposes this view requires information about both structure and conduct. It first asks whether conditions exist so that smoothly operating markets for technology can arise easily. If not, it then asks whether incumbents have access to a wide arsenal of strategic tactics during bargaining and whether these tactics have consequences for innovation by entrants.

This view suggests that policy should encourage the use of intellectual property in the service of making technology markets work smoothly, particularly when incumbent

assets are valuable. At the same time, it also raises questions about the competitive tactics of powerful firms in particular environments where intellectual property is weak.

Implications for antitrust policy.

Back to the main question: Does recent thinking suggest that incumbent firms deserve special scrutiny? I think yes, but to be fair, this thinking is not fully worked out.

As illustration, here is a modest proposal motivated by recent thinking. Consider a three-part test: First, does the incumbent firm possess market power and use it when bargaining with entrants? Second, are the scrutinized tactics closely affiliated with non-innovative behavior? Third, is there a rationale under which this action is in the user's interest?

Let me illustrate these questions with an example. This time I *am* going to pick on Microsoft--just to get the point across. The point, however, is broader than this example.

In the PC industry of 1995, the OEMs served as both assembler and distributor for many users. The dominant upstream supplier of operating systems insisted on restrictions in its contracts with OEMs that, in effect, foreclosed placing logos on the desktop from other applications, which were visible when users opened the box.

These so-called "first screen" restrictions on the "out-of-the-box" experience were in Microsoft's interest, to be sure; however, by the three part test they look like anticompetitive actions.

The market power test was satisfied. If there had been effective competitive alternatives for PC operating systems, then such exclusivity would not have been damaging, since users could hypothetically alter their purchasing decisions regarding

OEMs if they cared to. However, in this case, there was no serious alternative competitive choice to mitigate the damage -- Apple's recent come-back not withstanding.

The test about non-innovative tactics also was satisfied. The contract clause had little consequence for innovation at Microsoft. Notice that if it had, then one might be concerned about trading off different innovation incentives. That said, this clause certainly did have consequences for other firms' innovative behavior by raising distribution costs to application firms. It also became the source of considerable ire at OEMs because it prevented them from developing OEMs-specific help screens and tools for reducing after-sale service expenses.

Finally, the user's interest test was satisfied because the contracting clause encumbered user choice without any large gain.

According to this test, then, these contract restrictions were anti-competitive in the sense that non-innovative tactics diminished innovative behavior. More to the point, it suggests that only the most minimal contracting restrictions are appropriate in this setting. Once the product leaves Redmond, it is in society's interest to make sure that Redmond cannot protect itself from the harsh reality of user choice -- that is what gives Microsoft strong incentives to be innovate.

This is just an illustration of a broader principle. Public policy can encourage dominant firms to compete by innovating. It can do this by discouraging powerful incumbents from using non-innovative tactics that discourage innovation at other firms.

Finally, how far does this principal extend? For example, should public policy selectively intervene to discourage a powerful incumbent from using innovative tactics –

such as patent suits and patent blocking – to discourage innovation at other firms? The recent literature has not yet wrestled enough with this question to yield a general answer.

The main message.

These issues arise in many settings and will continue to arise. Information technology markets endemically produce firms with bottleneck positions over key assets.[11] These are also worlds with widely distributed technological capabilities. [12] Hence, it is inevitable that new inventors compete and cooperate with incumbent firms who control existing assets.

Traditional analysis too narrowly frames policy issues for this setting. It is more fruitful to think about how competition policy works through two mechanisms--by altering entry conditions and by altering the terms of bargains between powerful incumbents and innovative entrants. Policy should discourage dominant firms from using non-innovative tactics that hurt both downstream users and innovative competitors. The closer this gets society to innovative competition, the better.

References

[1] David C. Mowery and Rosenberg, Nathan (1998), *Paths of Innovation, Technological Change in 20th Century America*, Cambridge University Press.

[2] Arrow, Ken (1962), "Economic Welfare and the Allocation of Resources for Inventions," in R. Nelson (ed.), *The Rate and Direction of Inventive Activity: Economic and Social Factors,* Princeton, N.J.: Princeton University Press.

[3] Gilbert, Richard, and Newbury (1982), "preemptive patenting and the Persistence of Monopoly," *American Economic Review*, Vol. 72, pp. 514-526.

[4] Greenstein, Shane, and Ramey, Garey (1988), "Market Structure, Innovation, and Vertical Product Differentiation," *International Journal of Industrial Organization*, Vol 16 (3), Pp. 285-311.

[5] Gans, Joshua, and Scott Stern (2000), "Incumbency and R&D Incentives" Licensing the Gale of Creative Destruction," *Journal of Economics and Management Strategy*, 9(4), pp 485-511.

[6] Teece, David (1986), "Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy," *Research Policy*, 15, pp285-305.

[7] Levin, Rick, Al Klevorick, Richard Nelson, and Sidney Winter (1987), "Appropriating the Returns from Industrial R&D," *Brookings Papers on Economic Activity*.

[8] Cohen, Wesley, Richard Nelson, and John Walsh (2000), ""Protecting their Intellectual Assets: Appropriability Conditions and why US Manufacturing firms Patent (or not)," NBER Working Paper #7752. Cambridge, MA.

[9] Arora, Ashish, Andrea Fosfuri, Alfonso (2001) Gambardella, *Markets for Technology: The Economics of Innovation and Corporate Strategy,* MIT Press.

[10] Gans, Joshua, and Scott Stern (2000), "When Does Start-Up Innovation Spur the Gale of Creative Destruction?" NBER Working Paper #7851. Cambridge, MA.

[11] Greenstein, Shane (1998), "Industrial Economics and Strategy: Computing Platforms," *IEEE Micro: Chips, Systems, and Applications, Special issue on Standardization,*18 (3), Pp. 43-53.

[12] Bresnahan, Timothy, and Shane Greenstein (1999), "Technological Competition and the Structure of the Computing Industry," *Journal of Industrial Economics.*